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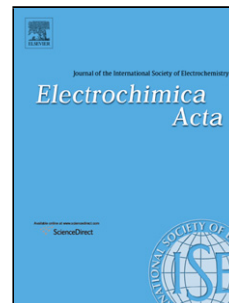
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Electrochemical studies on the codeposition of copper and tellurium from acidic nitrate solution

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Abstract

The paper describes electrochemical studies on the deposition of copper or/and tellurium from nitrate solutions of pH 0.25. Cyclic voltammetry, electrochemical quartz crystal microbalance and potentiostatic measurements showed that two Cu_xTe phases can be electrodeposited. In the potential range from -100 mV to -500 mV (vs. Ag/AgCl) “low-copper” deposits ($\sim Cu/Te$ ratio of 1.2 ± 0.2) were obtained, while for the potentials below -600 mV “copper-rich” films ($\sim Cu/Te$ ratio of 1.6 ± 0.1) were produced. It was confirmed by anodic responses in the CV reverse scan: oxidation of the “low-copper” phase can correspond to the anodic peak at about 230 mV, while “copper-rich” phase was oxidized at about 180 mV. Thermodynamic arguments for the Cu-Te system suggest that deposition of “low-copper” Cu_xTe deposits can be obtained during cooperative reduction of Te(IV) with Cu(II) ions, while “copper-rich” phase was attributed to reaction of tellurium(II) species with Cu(I) ions. Gradual shift of the potential towards more negative values resulted in the change of the morphology of the layers from crystalline via dendritic to porous.

Keywords: copper; tellurium; electrodeposition;

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